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# ***Grain Stocks Estimates: Can Anything Explain the Market Surprises of Recent Years?***

***Scott H. Irwin***



illinois.edu

## Corn Controversies Impact the Hog Market

Steve Meyer

Oct. 4, 2010

<http://nationalhogfarmer.com/weekly-preview/1004-corn-controversies-hog-market>

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## Faulty Forecasts Roil Corn Market

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By LIAM PLEVEN And TOM MCGINTY

December 5, 2011

<http://online.wsj.com/news/articles/SB10001424052970203752604576641561657796544>

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10:17 GMT, Friday, 28<sup>th</sup> Sept 2012, by Agrimoney.com

## Ag investors brace for controversy, as US stocks data loom

<http://www.agrimoney.com/feature/ag-investors-brace-for-controversy-as-us-stocks-data-loom--170.html>



[http://dakotafire.net/wp-content/uploads/2012/10/IMG\\_1661.jpg](http://dakotafire.net/wp-content/uploads/2012/10/IMG_1661.jpg)



ISSN: 1949-0925

## Corn Corn

Steve Meyer

BUSINESS

## Fault



By LIAM

December



Ag

http

## Grain Stocks

Released September 30, 2010, by the National Agricultural Statistics Service (NASS), Agricultural Statistics Board, United States  
Department of Agriculture (USDA).

**Corn Stocks Up 2 Percent from September 2009**  
**Soybean Stocks Up 9 Percent**  
**All Wheat Stocks Up 11 Percent**

**Old crop corn** stocks in all positions on September 1, 2010 totaled 1.71 billion bushels, up 2 percent from September 1, 2009. Of the total stocks, 485 million bushels are stored on farms, down 20 percent from a year earlier. Off-farm stocks, at 1.22 billion bushels, are up 15 percent from a year ago. The June - August 2010 indicated disappearance is 2.60 billion bushels, compared with 2.59 billion bushels during the same period last year.

**Old crop soybeans** stored in all positions on September 1, 2010 totaled 151 million bushels, up 9 percent from September 1, 2009. Soybean stocks stored on farms totaled 35.4 million bushels, up 1 percent from a year ago. Off-farm stocks, at 116 million bushels, are up 12 percent from last September. Indicated disappearance for June - August 2010 totaled 420 million bushels, down 8 percent from the same period a year earlier.

After analyzing the end-of-marketing year stock estimates, disappearance data for exports and crushings, and farm program administrative data, no revisions were made to the 2009 soybean production.

**All wheat** stored in all positions on September 1, 2010 totaled 2.46 billion bushels, up 11 percent from a year ago. On-farm stocks are estimated at 826 million bushels, down 1 percent from last September. Off-farm stocks, at 1.63 billion bushels, are up 19 percent from a year ago. The June - August 2010 indicated disappearance is 740 million bushels, up 12 percent from the same period a year earlier.

**Durum wheat** stocks in all positions on September 1, 2010 totaled 106 million bushels, up 4 percent from a year ago. On-farm stocks, at 76.8 million bushels, are up 4 percent from September 1, 2009. Off-farm stocks totaled 29.0 million bushels, up 5 percent from a year ago. The June - August 2010 indicated disappearance of 40.2 million bushels is up 24 percent from the same period a year earlier.



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# Glauber says USDA studying corn stocks controversy

BY CHRISTINE STEBBINS

CHICAGO Thu Jun 20, 2013 5:21pm EDT



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# Glauber says USDA studying corn stocks controversy

BY CHRISTINE STEBBINS

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## USDA and corn stocks controversy [New]

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06-21-2013 07:46 AM

Not sure what if anything will come from this but it is interesting that they are investigating.

0



<http://www.reuters.com/article/2013/06/20/us-grains-usda-idUSBRE95J17I20130620>



## Evaluation of Selected USDA WAOB and NASS Forecasts and Estimates in Corn and Soybeans

by

Scott H. Irwin, Dwight R. Sanders, and Darrel L. Good

### Suggested citation format:

Irwin, S.H., D.R. Sanders, and D.L. Good. "Evaluation of Selected  
USDA WAOB and NASS Forecasts and Estimates in Corn and  
Soybeans." Marketing and Outlook Research Report 2014-01,  
Department of Agricultural and Consumer Economics, University of  
Illinois at Urbana-Champaign, January 2014.  
<http://www.farmdoc.illinois.edu/marketing/reports>

## Evaluation of Selected USDA WAOB and NASS Forecasts and Estimates in Corn and Soybeans

### Executive Summary

The United States Department of Agriculture (USDA) has a number of agencies that are involved in collecting, analyzing, forecasting, and disseminating information about the production and consumption of the corn and soybean crops (Spilka, 1983; Vogel and Bange, 1999; Lusk, 2013). Market participants rely heavily on estimates and forecasts provided by these agencies in order to form price expectations and to make business decisions. In spite of on-going efforts to maintain the quality of information provided and the transparency of the methodology used, misunderstanding, concerns, or complaints about the information provided periodically arise (e.g., USDA/ESRP, 1985; Good and Irwin, 2011). More recently (since 2006) those concerns have centered on the accuracy of the quarterly estimates of corn inventories and to a lesser extent on the methodology and accuracy of early season yield forecasts (e.g., Polansek, 2010; Plevin and McGinty, 2011). It is in that context that this review of USDA forecasts and estimates for corn and soybeans was conducted.

The main findings of the statistical analysis are as follows:

- WAOB corn and soybean yield forecasts made in May, June, and July do not have a substantial bias. The accuracy of the forecasts also has not changed markedly over the 1993-2012 time period for either corn or soybeans. With a few exceptions, WAOB corn and soybean forecast errors since 2006 generally are within the historical range of errors.
- NASS yield forecasts for corn reveal no evidence of bias in any month over 1990-2012 and forecast errors since 2006 are well within the historical range of errors. There is some evidence of improvement in the accuracy of NASS corn yield forecasts over time. Soybean forecast errors since 2006 are also within the historical range, except for September and October 2012, and there is no statistical change in the magnitude of forecast errors for soybean yields over time. However, there is a general tendency for soybean forecasts to be conservative, in the sense of underestimating final yield. In addition, market analysts consistently under-estimated NASS production forecasts during the first half of the sample and over-estimated production forecasts during the second half.
- There has been a sharp decline in market analysts' ability to anticipate quarterly corn usage as implied by NASS *Grain Stocks* reports since the start of the 2006 marketing year. Double-digit implied usage surprises occurred





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**February 7, 2014**

## Explanations for Recent Surprises in USDA Corn Stocks Estimates: How Well Do they Hold Up?

In a *farmdoc daily* post last week, we showed that there has been a notable decline in the ability of market participants to anticipate USDA stocks estimates for corn in recent years. Numerous explanations have been offered for the decline, ranging from problems with the survey procedures used by the USDA to the rise of ethanol production. We also argued in last week's post that to have credibility any possible explanation for recently observed large surprises in corn inventory levels needs to satisfy four criteria: 1) Why corn and not soybeans? 2) Why 2006-2012 and not earlier? 3) Why only in particular marketing years? and 4) Why a pattern of reversals during marketing years? In today's post we use these criteria to examine some commonly proposed explanations for recent large surprises in USDA corn stocks estimates. The following sections provide a brief discussion of the identified explanations. This is the third in a series of *farmdoc daily* posts discussing the findings of our recent report, which can be found [here](#). The research was funded by the [Office of the Chief Economist of the USDA](#).

# <http://www.farmdocdaily.illinois.edu>



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# ***Is There a Problem with USDA Grain Stocks Estimates in Corn?***

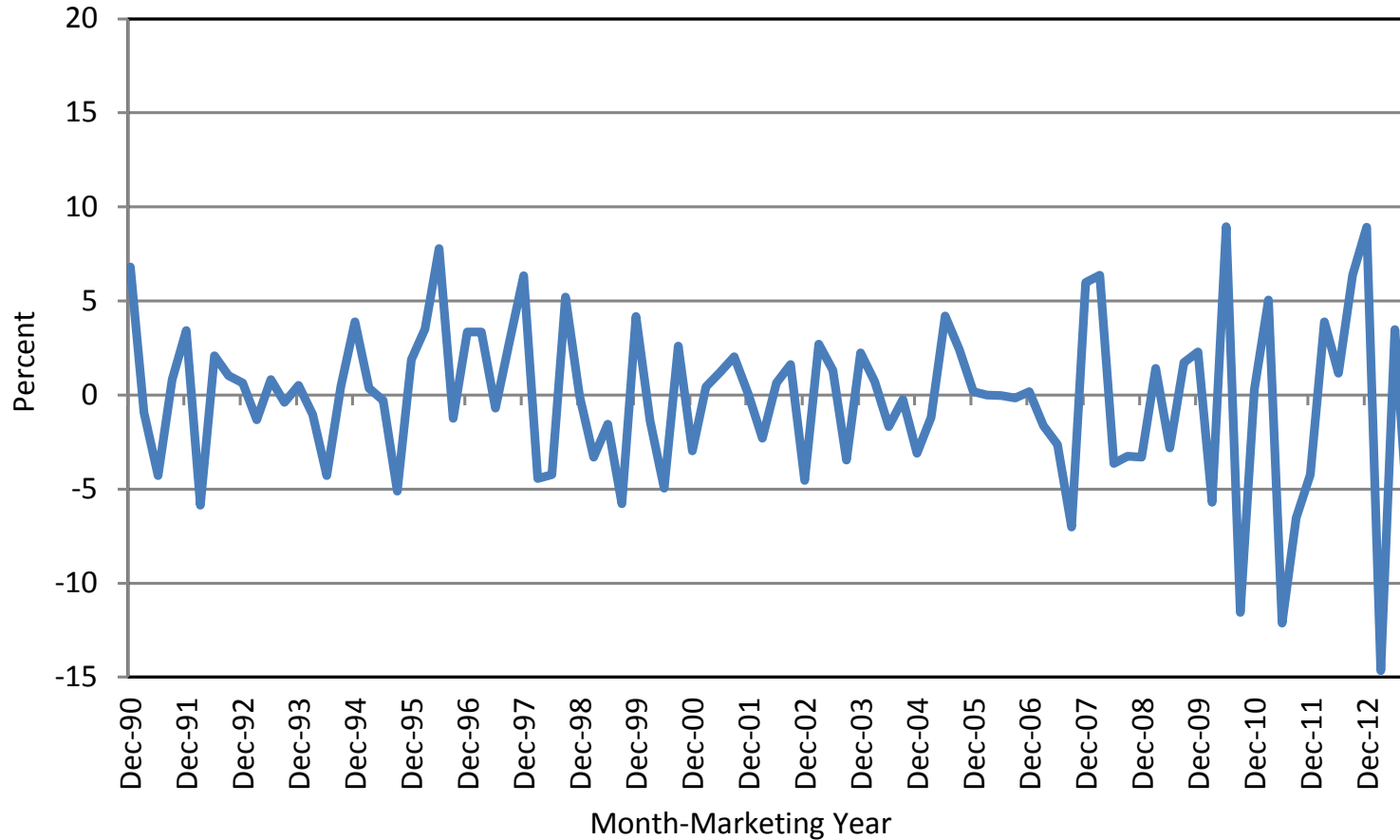


# ***Market Surprises for NASS Grain Stocks Estimates***

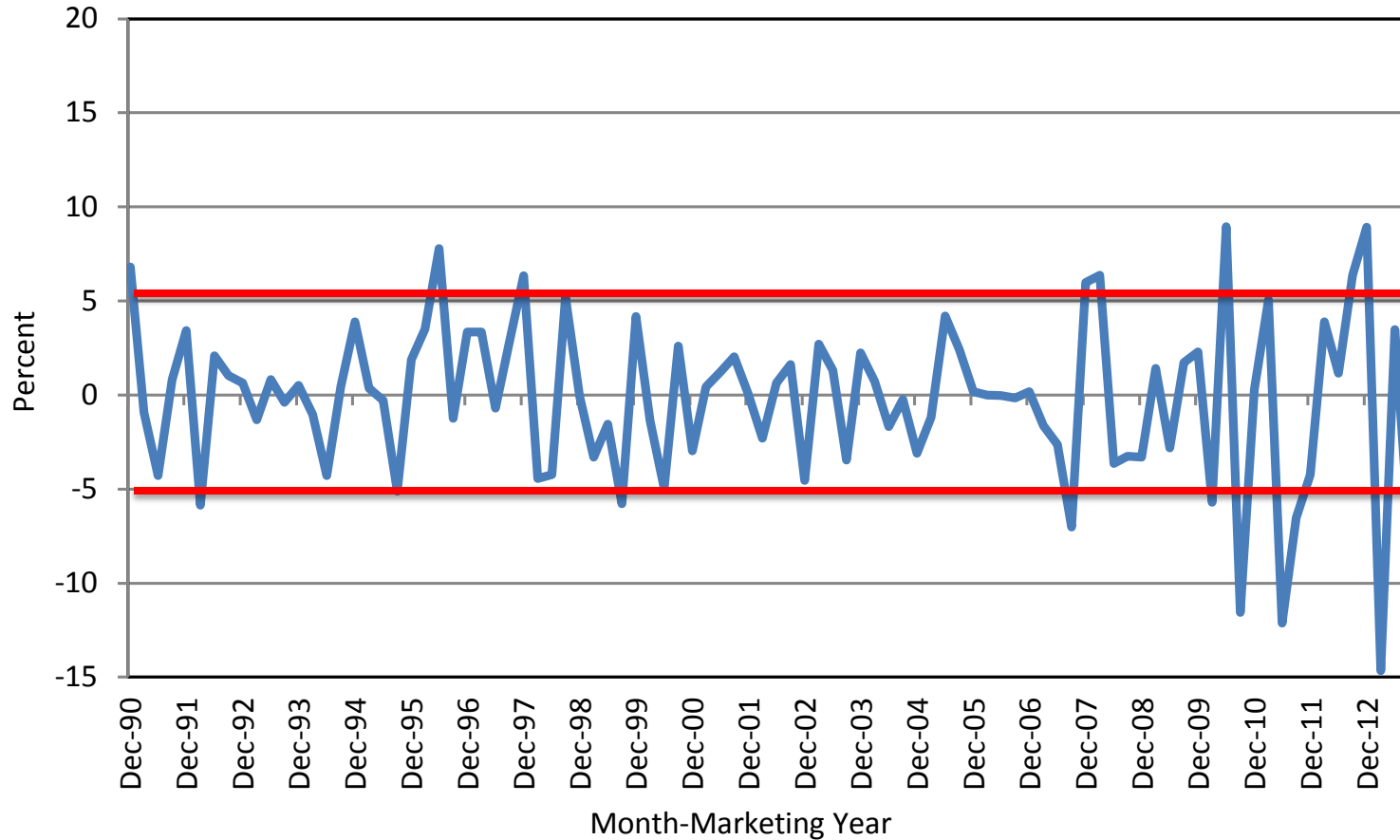
- Examine NASS quarterly corn and soybean stocks estimates relative to pre-release estimates by private sector analysts
  - Should reveal problematic grain stocks estimates
  - 1990-91 through 2012-13 marketing years
- Analyst estimates of corn and soybean stocks are based on estimates of usage during the quarter that ends with the reference date of the *NASS Grain Stocks* report
- Percentage usage surprise normalizes for
  - Changing usage levels across the marketing year
  - Varying usage levels across corn and soybeans



# ***Market Surprise for NASS Quarterly Implied Usage Estimates, U.S. Corn, 1990-2012 Marketing Years***

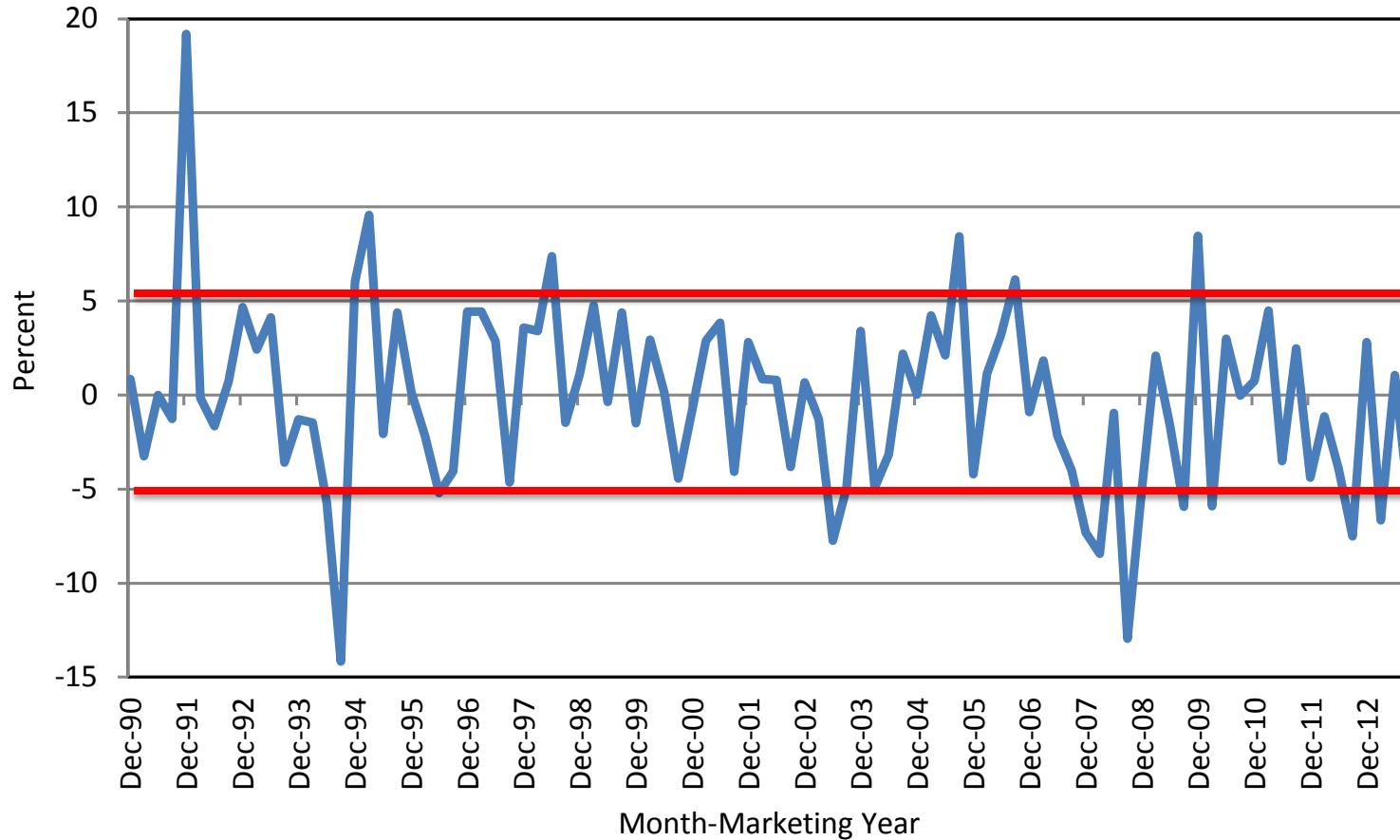


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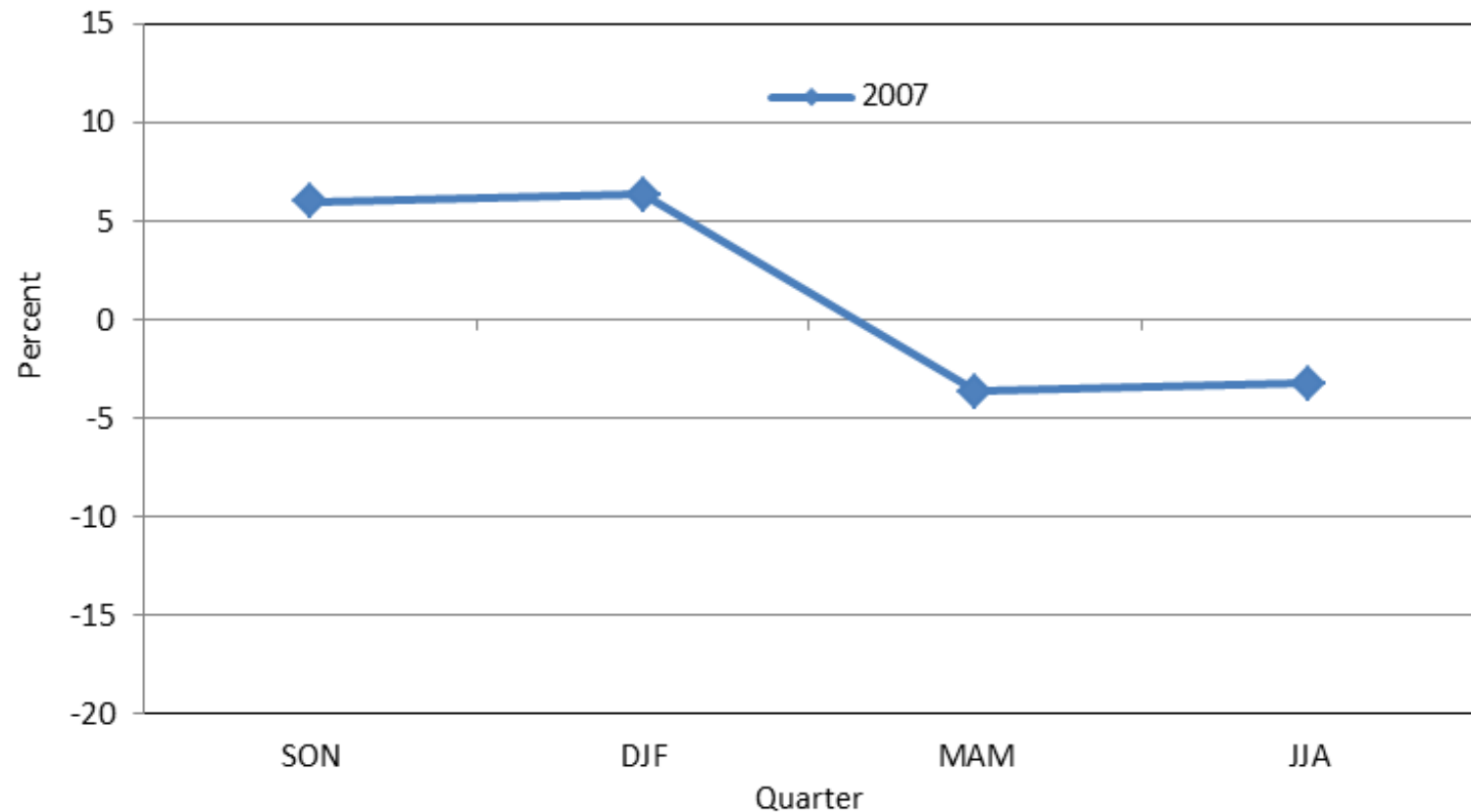




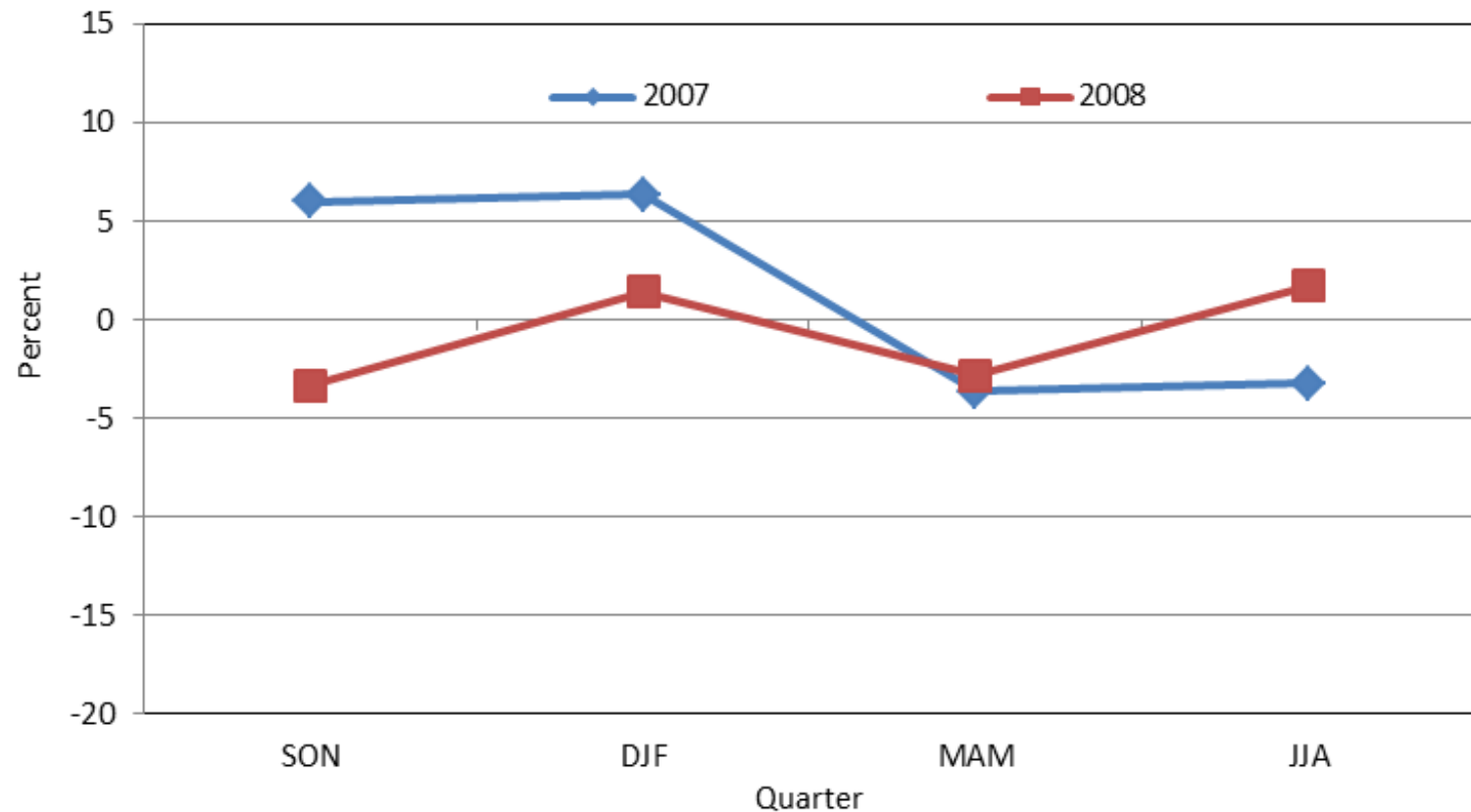
# ***Market Surprise for NASS Quarterly Implied Usage Estimates, U.S. Soybeans, 1990-2012 Marketing Years***



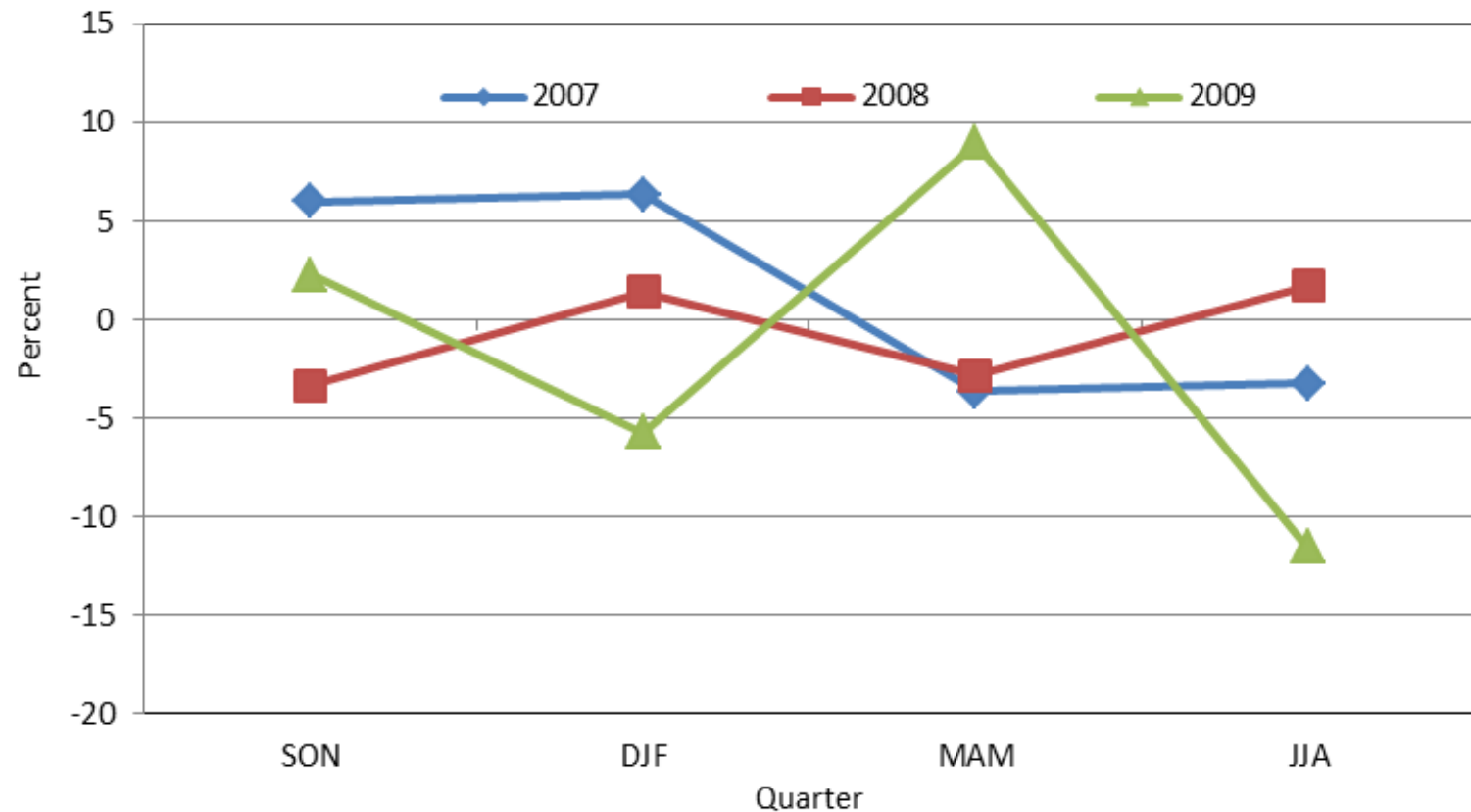
## ***Market Surprise for NASS Quarterly Implied Usage Estimates by Marketing Year, U.S. Corn, 2007-2012 Marketing Years***



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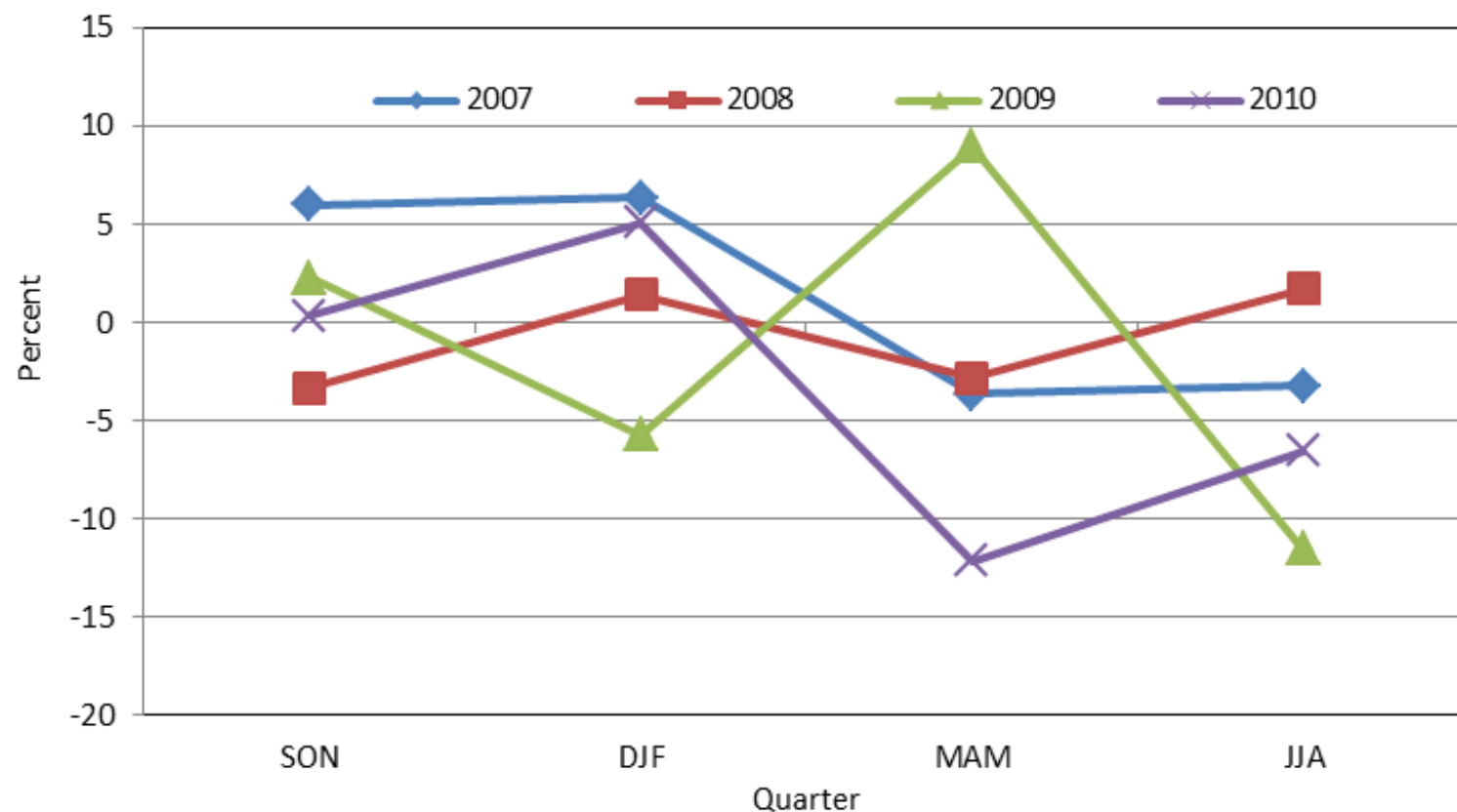


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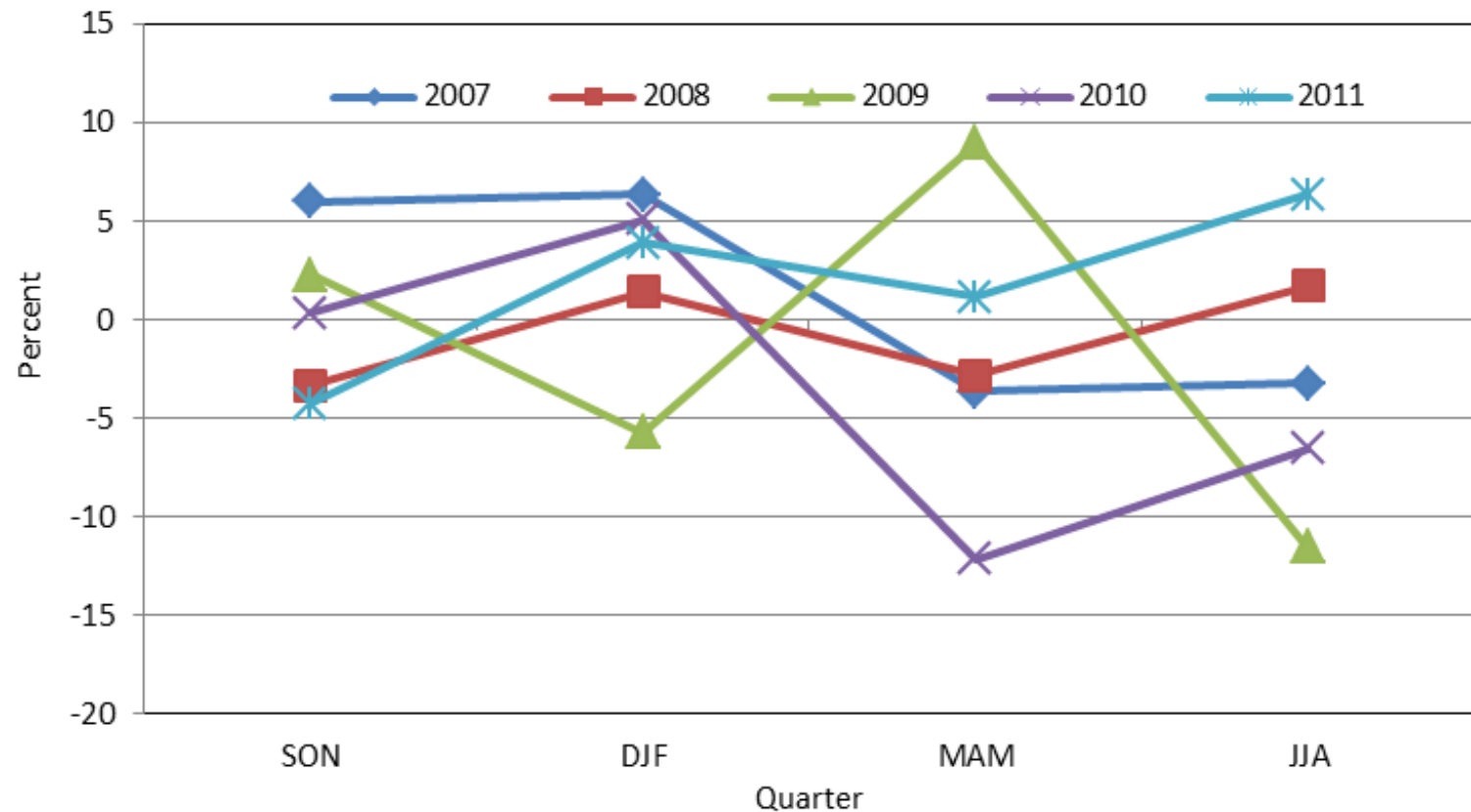




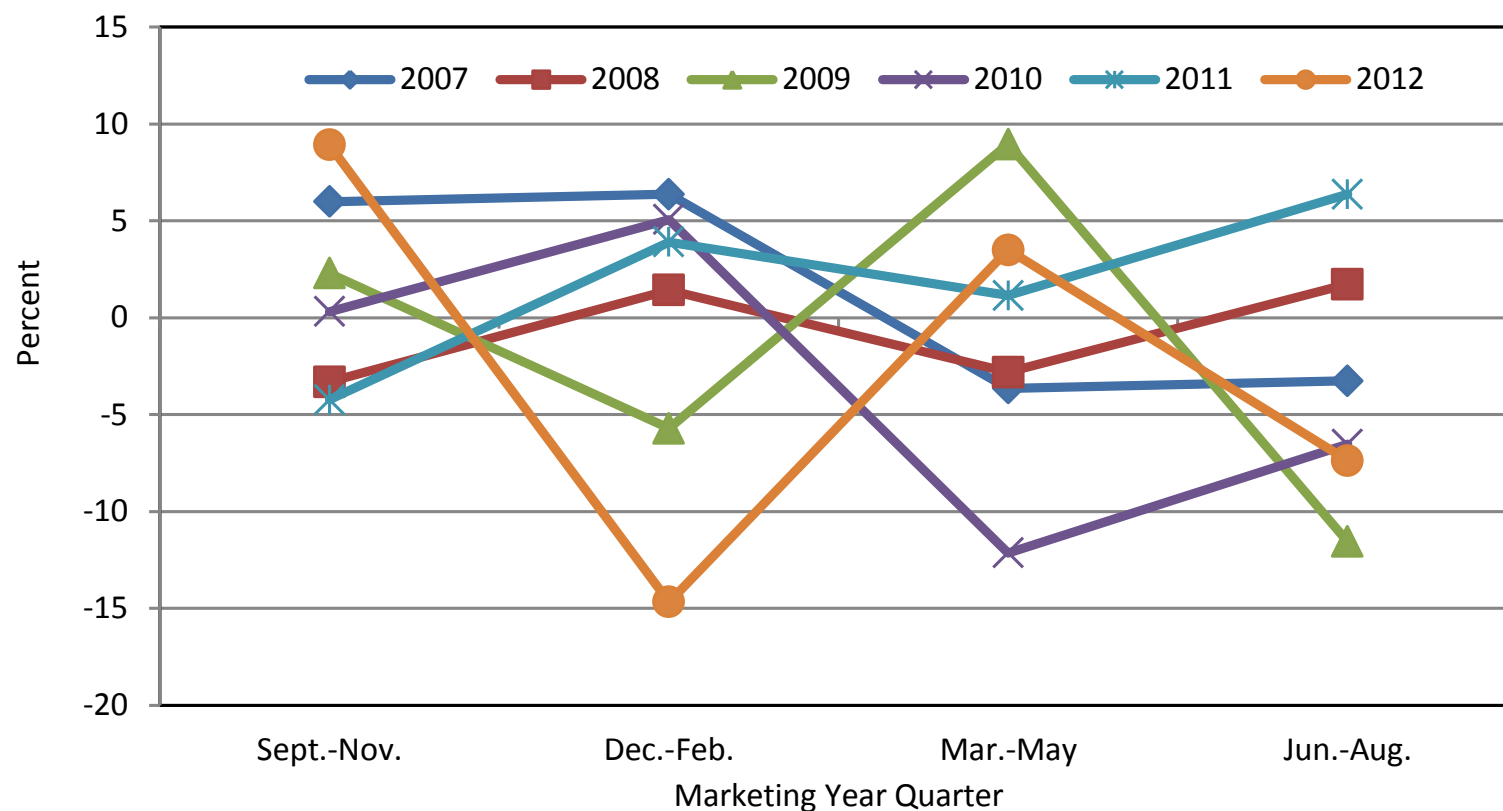
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# ***Market Surprise for NASS Quarterly Implied Usage Estimates by Marketing Year, U.S. Corn, 2007-2012 Marketing Years***



# ***Criteria for Valid Explanation of Market Surprises***

1. Why corn and not soybeans?
2. Why 2006-2012 and not earlier?
3. Why only in particular marketing years (2009, 2010, and 2012)?
4. Why a pattern of reversals during marketing years?





# ***How Well Do Explanations for Recent Surprises in USDA Corn Stocks Estimates Hold Up?***



# ***Explanations Offered for Market Surprises***

- Producer estimation of stocks based on volume rather than weight
- Mixing of old crop and new crop stocks by survey respondents
- Failure to capture the changing geography of corn production
- Failure to capture the change in number and size of on-farm storage facilities
- Changing make-up of the sample for Agricultural Surveys during the marketing year
- Reduced response rate to the Agricultural Surveys
- Increased errors in grain stocks reporting by commercial facilities associated with the large increase in the number of ethanol plants
- increase of corn in transit due to the increased movement of grain off-farm to ethanol plants



# ***Volume vs. Weight***

- Corn stocks are measured in terms of 56-pound bushels
- If producers do not account for variation in density (counting grain bin rings) reporting errors could result
- Explanation is consistent with:
  - ✓ Surprises in corn but not soybeans
  - ✓ Surprises in some marketing years and not others
- Explanation is inconsistent with:
  - ✓ Lack of evidence that density error rate increased starting in 2006
  - ✓ Variation of surprises within marketing years
  - ✓ Reversal pattern for surprises in 2009, 2010, and 2012



# ***Mixing of Old Crop and New Crop for September 1***

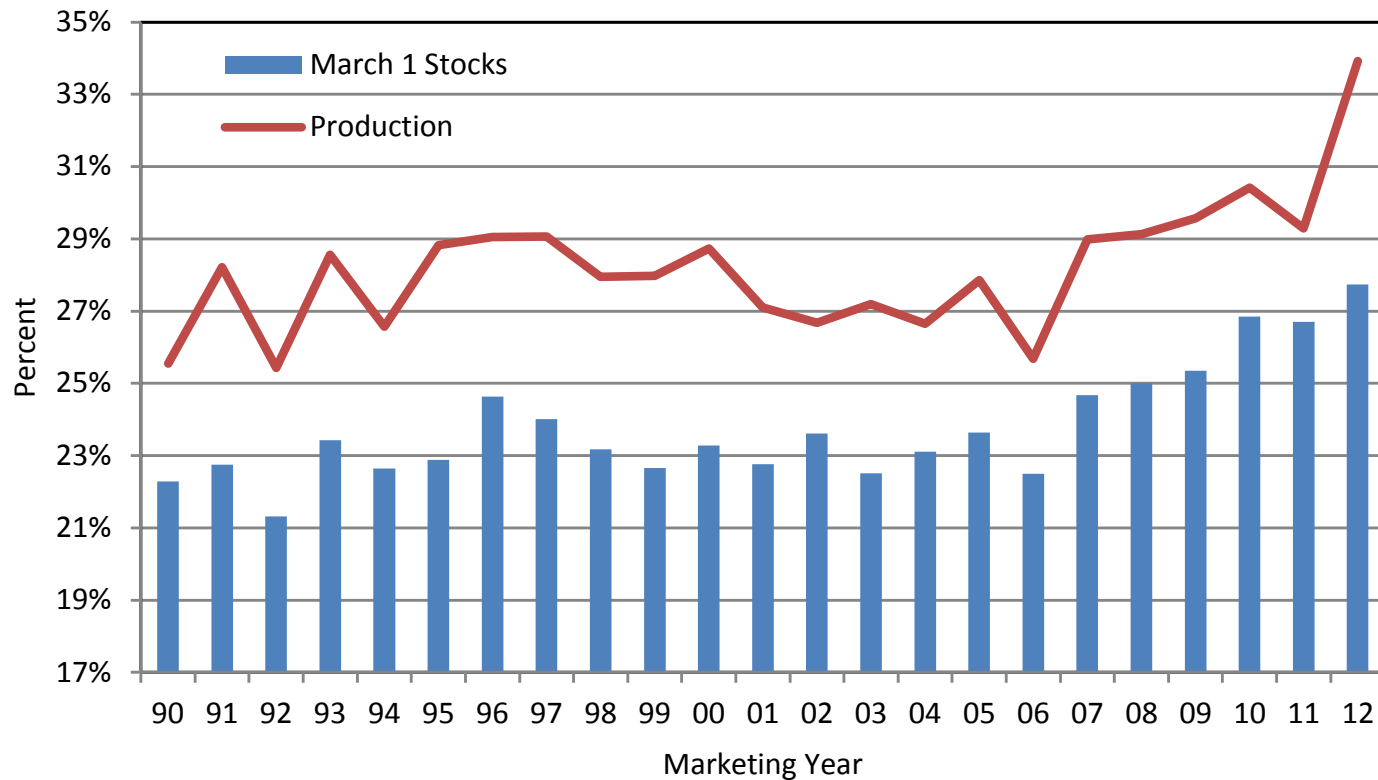
- Claim that survey respondent stock estimates on September 1 include new crop harvested before September 1
- Explanation fails because:
  - ✓ Analysts do not consistently under-estimate USDA stocks
  - ✓ USDA survey forms specifically ask respondents to only report "old crop" stocks
  - ✓ Commercial facilities recently asked to report old and new crop inventories separately
  - ✓ Both over- and under-estimates of old vs. new crop stocks should be observed, which would tend to cancel out





# Changing Geography of Corn Production

## U.S. Corn Production and Stocks Outside of 7-State Area, 1990-2012 Marketing Years

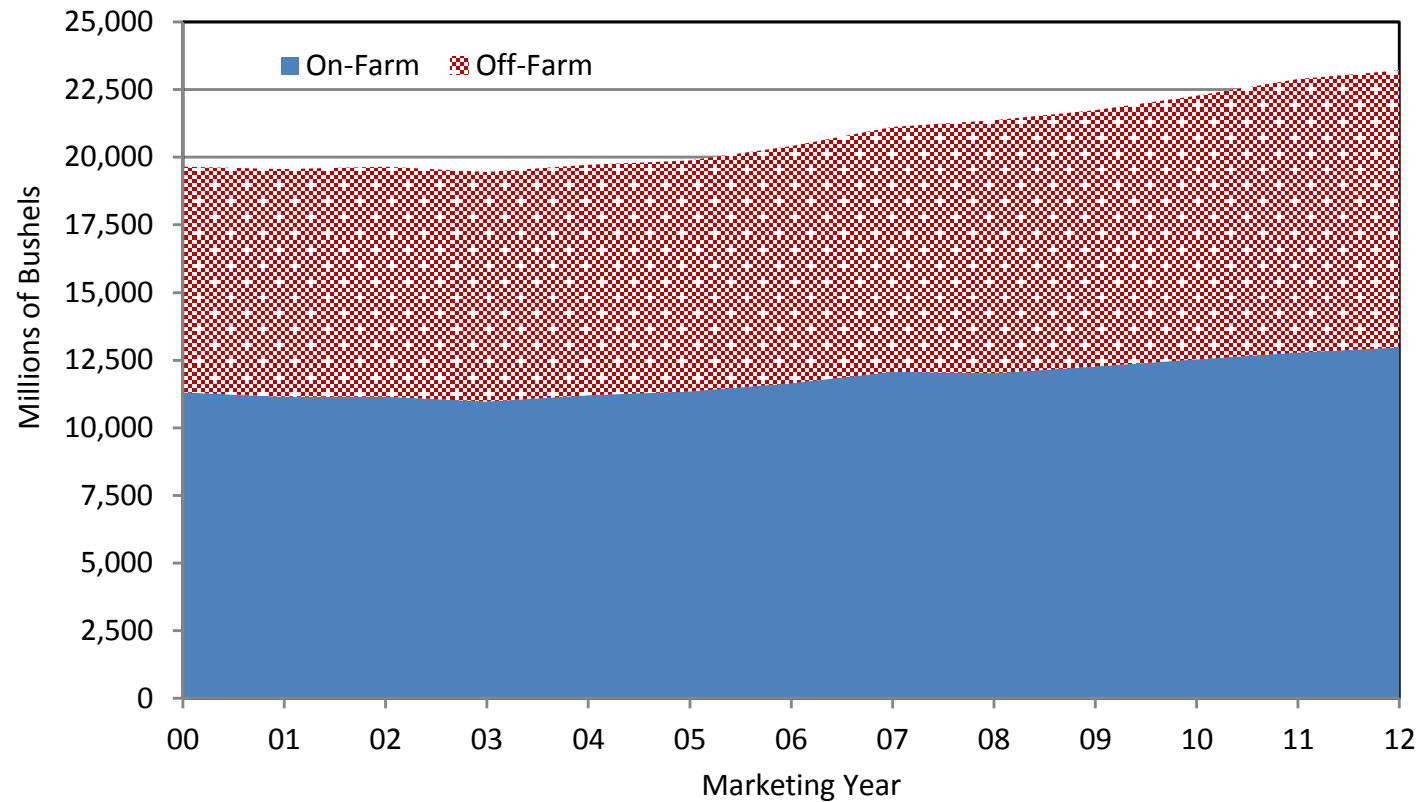


Note: 7-state area includes Illinois, Indiana, Iowa, Minnesota, Missouri, Nebraska, and Ohio



# ***Changing Number and Size of On-Farm Grain Facilities***

## **U.S. Grain Storage Capacity, 2000-2012 Marketing Years**



# ***Changing Make-Up of Survey Sample During the Marketing Year***

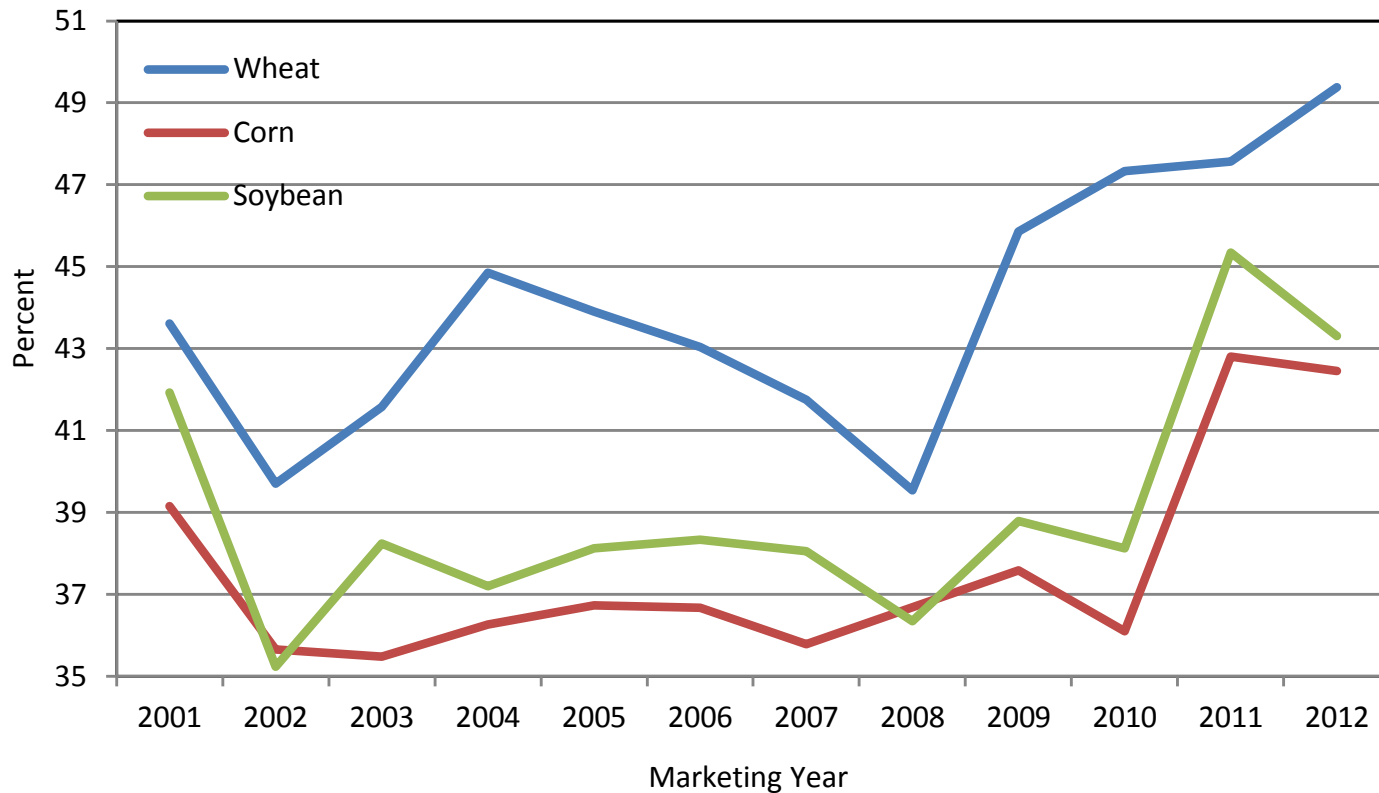
- Claim that changing number and make-up of producer respondents through survey cycle accounts for surprises
- Explanation fails because:
  - ✓ Survey methodology has been constant over time
  - ✓ Large surprises in corn but not soybeans
  - ✓ Sample sizes are large enough to produce statistically consistent results
  - ✓ Random selection of sample respondents

11 222222220  
SURVEY CODE=11-22222221-AA1AAA  
JQP FARMS  
JOHN Q PUBLIC  
123 CTY RD 1  
ANYTOWN, ST 12345-6789

**Example Mailing Label**

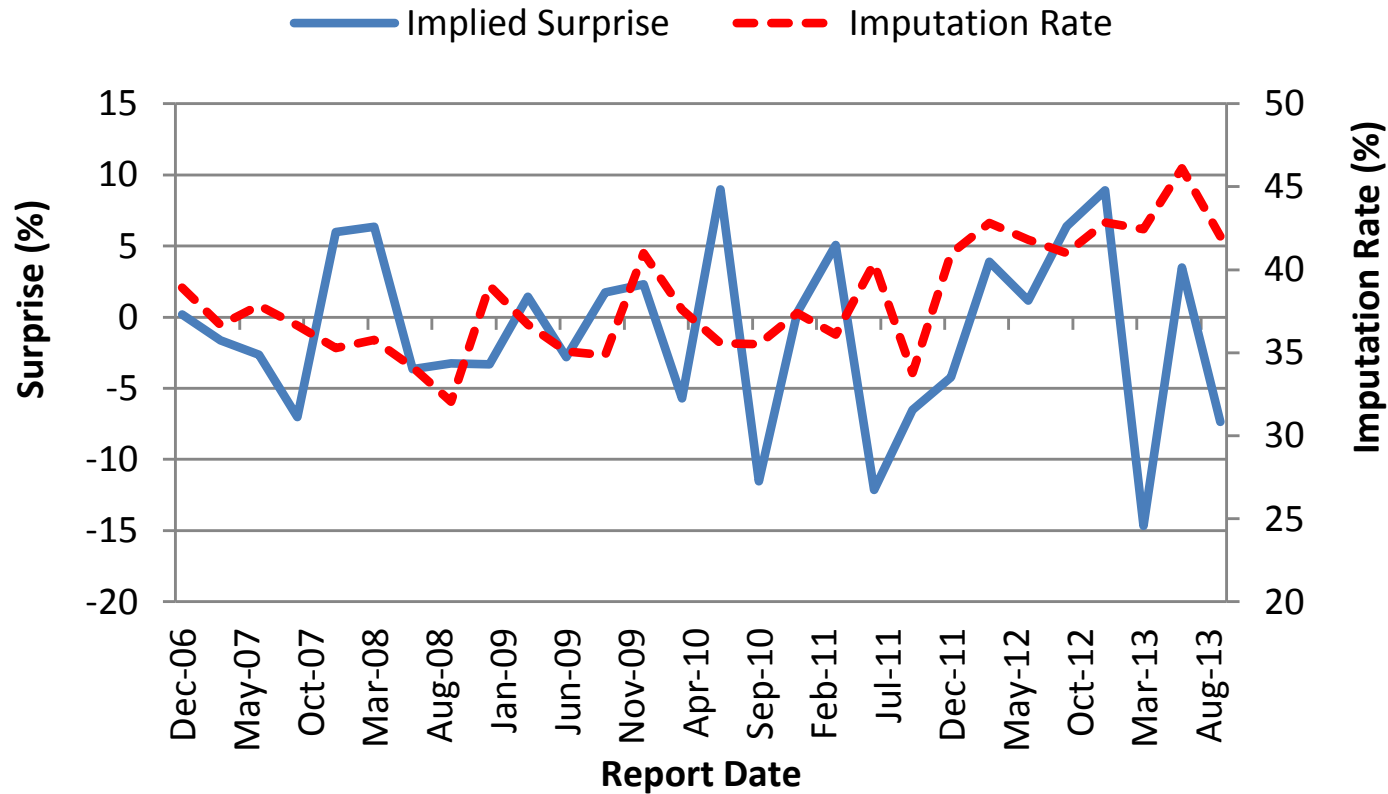
# *Reduced Survey Response Rates*

## **NASS March 1 On-Farm Stocks Estimates, Imputation Rates, 2001-2012 Marketing Years**



# Reduced Survey Response Rates

Surprise in NASS Implied Usage Estimates and Survey Imputation Rates for NASS Stocks Estimates, U.S. Corn, December 2006-September 2013 *Grain Stocks Reports*



# ***Increase in Number of Ethanol Plants***

- Observation that increase in large surprises coincides with growth in ethanol production
- Explanation fails because:
  - ✓ No evidence of double-counting or exclusion of some plants from off-farm surveys
  - ✓ Ethanol plants generally have limited storage
  - ✓ Double-counting or exclusion errors cannot account for large surprises in certain marketing years or the reversal pattern in some years



# ***Increased Corn in Transit***

- Claim that more corn is in transit due to increase in production and consumption, particularly movement to ethanol plants
- Explanation fails because:
  - ✓ Amount of grain in transit should be fairly constant through marketing year
  - ✓ A rough estimate is that corn in transit on any given day is about 25-50 million bushels, which is not large enough to explain magnitude of large surprises
  - ✓ Cannot account for large surprises in certain marketing years or the reversal pattern in some years



# ***Incorrect USDA Estimates of Corn Used for Ethanol***

- Claim that USDA under-estimates ethanol yield per bushel of corn which over-estimates corn use for ethanol and under-estimates corn use in the feed and residual category
- Explanation fails because:
  - ✓ No link between ethanol yield and quarterly stocks
  - ✓ Measurement of stocks is not dependent on distribution of use





# ***Is There Any Explanation for Recent Surprises in USDA Corn Stocks Estimates?***



# ***Sampling Errors for NASS Corn Stocks Estimates***

## **Quarterly Corn Stock Estimates, Confidence Intervals, and Market Surprises: December 2009-December 2013**

Date	All Stocks mil. bu.	On-farm Stocks mil. bu.	95 % Confidence plus/minus percent	95 % Confidence plus/minus mil. bu.	Stocks Surprise* mil. bu.
Dec. 1, 2009	10902	7405	2.8	207	89
Mar. 1, 2010	7694	4548	3.0	136	-185
Jun. 1, 2010	4310	2131	4.0	85	303
Sept. 1, 2010	1708	485	5.6	27	-301
Dec. 1, 2010	10057	6302	2.8	176	13
Mar. 1, 2011	6523	3384	4.4	149	178
Jun. 1, 2011	3670	1682	4.6	77	-346
Sept. 1, 2011	1128	315	7.6	24	-166
Dec. 1, 2011	9647	6175	3.0	185	-163
Mar. 1, 2012	6023	3192	4.4	140	142
Jun. 1, 2012	3148	1482	5.4	80	33
Sept. 1, 2012	989	314	7.8	24	138
Dec. 1, 2012	8033	4586	3.4	156	334
Mar. 1, 2013	5400	2669	4.8	128	-386
Jun. 1, 2013	2766	1260	6.2	78	92
Sept. 1, 2013	821	275	8.0	22	-143
Dec. 1, 2013	10426	6380	3.4	217	216

\* Dec. 1 surprise is adjusted by any unexpected change in the corn production estimate revealed in the January Annual Crop Production report.

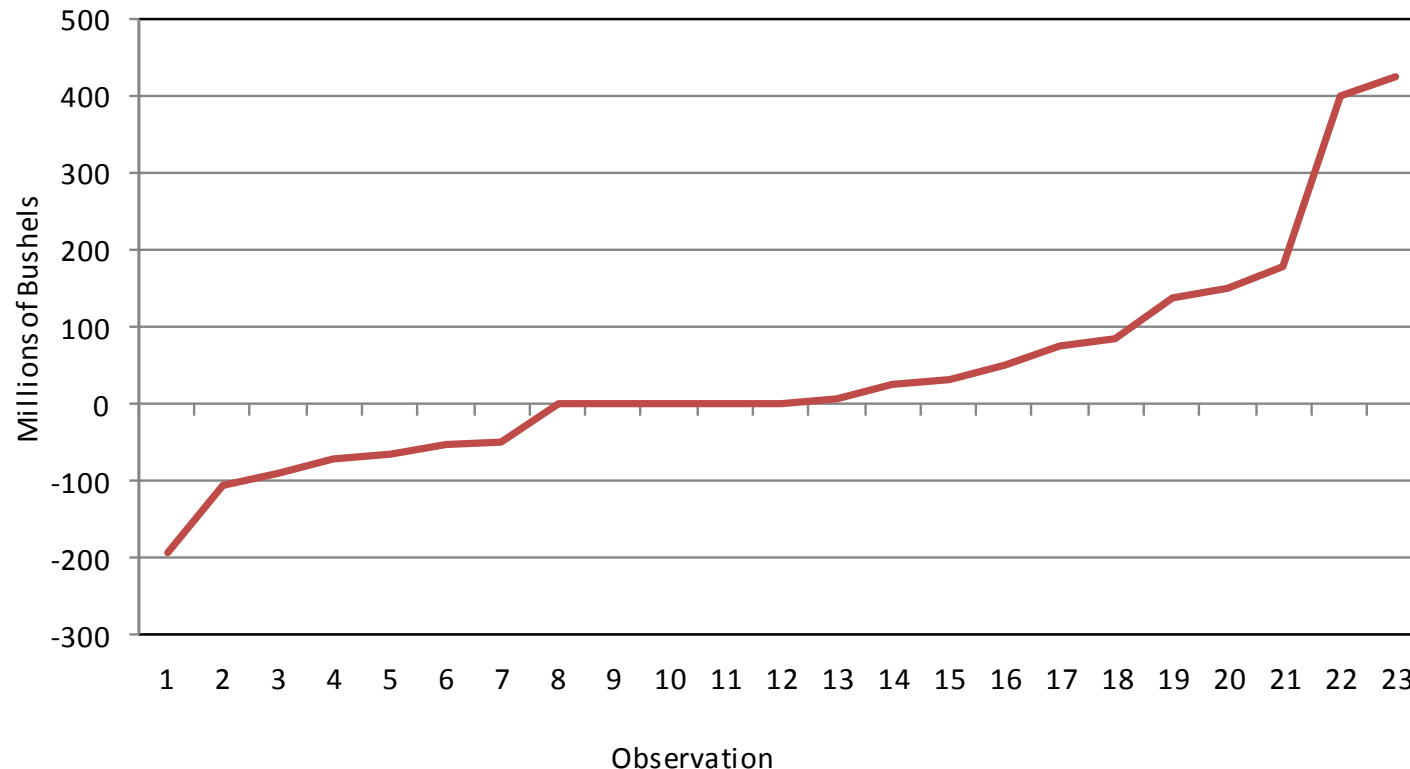
# ***Unresolved NASS Corn Production Errors***

- Large market surprises may be related to large sampling errors for NASS January production estimates
  - Tendency among market analysts to declare January production estimates as “final,” and therefore, having minimal or no errors
  - NASS is always careful to include a detailed discussion of potential sampling errors in production reports
  - 2012 corn production of 10.780 billion bushels: 95 percent confidence interval is 10.543 to 11.017 billion bushels (10.780 +/-2.2%), or a range of 474 million bushels
  - 2013 corn production of 13.925 billion bushels: 95 percent confidence interval is 13.535 to 14.315 billion bushels (13.925 +/-2.8%), or a range of 780 million bushels
- If January production estimate is too large, then market may interpret subsequent stock estimates as implying surprisingly large usage and *vice versa*
  - The sampling error in production is reflected in feed and residual use
  - Never resolved because there is no independent measurement of feed use



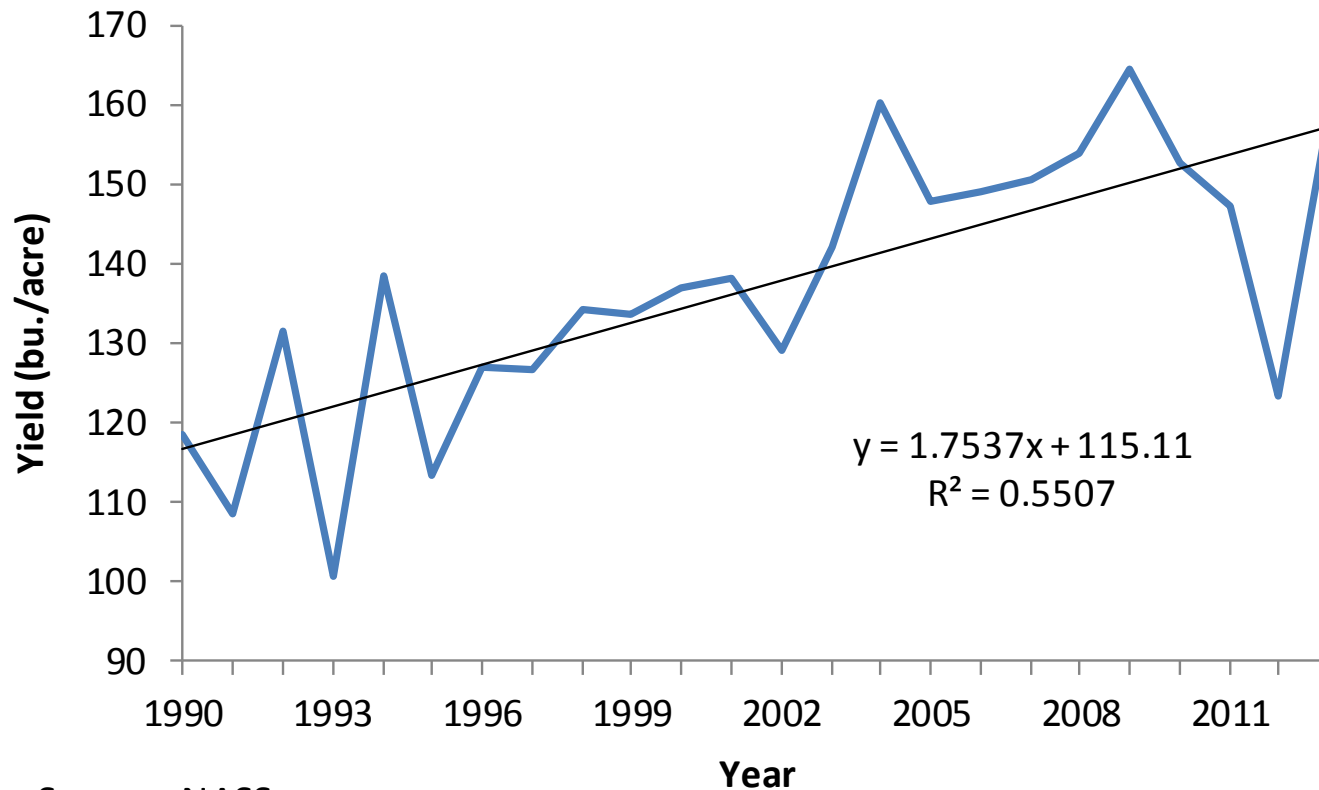
## ***Criteria #1: Why Corn and Not Soybeans?***

**Simulated Revisions to NASS Corn Production Estimates based on September Revisions to NASS Soybean Production Estimates, 1990-2012 Marketing Years**



## ***Criteria #2: Why 2006-2012 and Not Earlier?***

**U.S. Average Corn Yield, 1990-2012 Marketing Years**

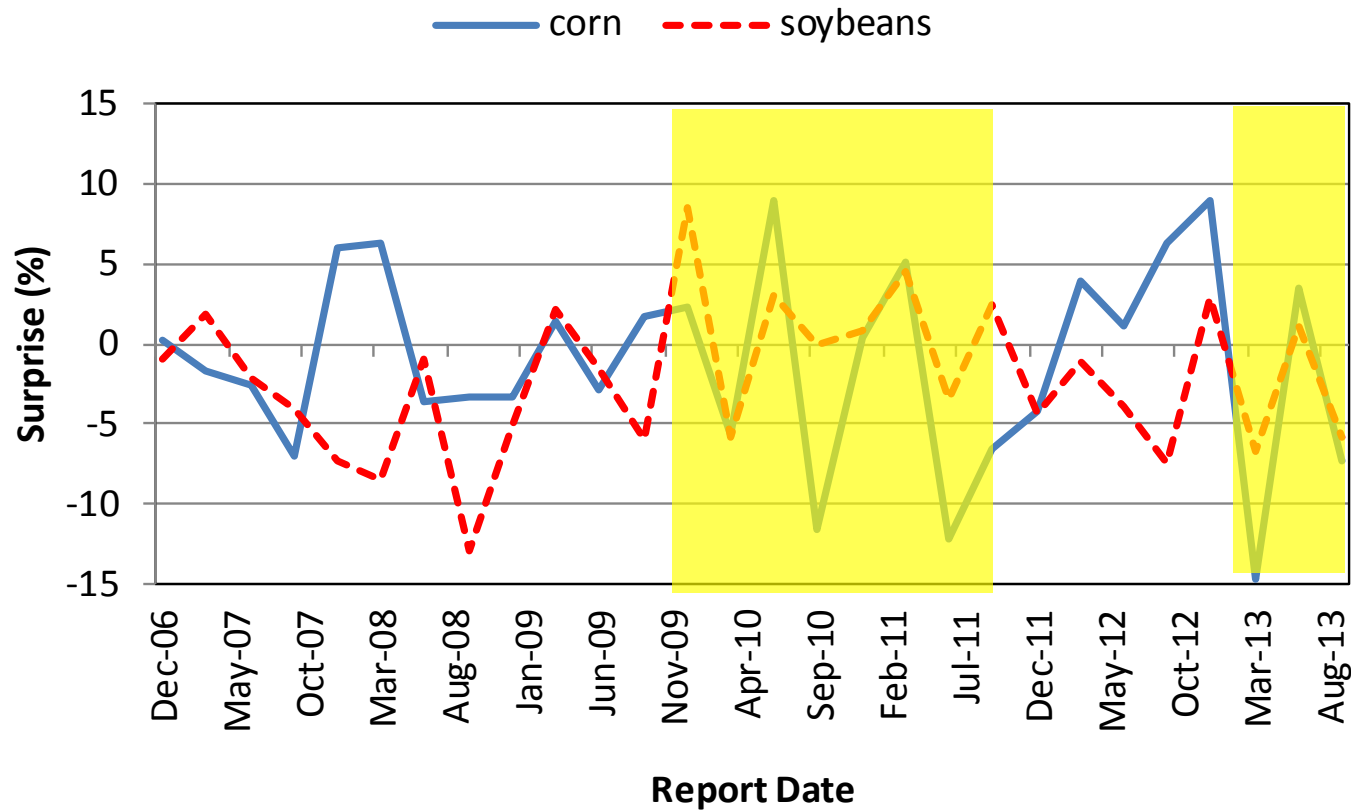


Source: NASS



## Criteria #3: Why Only in Particular Marketing Years?

Surprise in NASS Implied Usage Estimates for NASS Stocks Estimates, U.S. Corn and Soybeans, December 2006-September 2013 *Grain Stocks Reports*



## ***Criteria #4: Why a Pattern of Reversals During Marketing Years?***

- Market analysts may mistakenly view a stock surprise as a usage surprise when in fact the stock surprise is the result of unresolved sampling errors in production estimates
- This leads to a reversal in the sign of the subsequent surprise as the true rate of usage is revealed
- While this is a logical possibility, the reversals could be associated with other factors, particularly sampling errors in the stock estimates themselves



## *Summary*

- USDA stocks estimates undoubtedly encompass sampling errors for both production and stocks estimates
  - Sampling errors for stocks estimates are too small to explain large surprises
  - Sampling errors for corn production estimates are large enough to explain even the largest surprises over the 2006-07 through 2012-13 marketing years
- Highlights value of adding a survey of corn feed use that would allow:
  - Full accounting of corn usage
  - Revision of January corn production estimates similar to what has been historically possible for soybeans

